

CLAIMS:

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1. Method of processing a series of x-ray images of an object of interest, wherein the object of interest is visible due to a contrast medium, the method comprising the step of:

10 automatically determining an image of the series of x-ray images where the object of interest is not sufficiently filled with the contrast medium.

2. The method of claim 1, further comprising the steps of:

enhancing parts of the object of interest visible in respective images of the series of x-ray images;

15 preprocessing the respective images of the series of time series x-ray images such that a background of the object of interest is at least partly suppressed.

3. The method of claim 2, further comprising the steps of performing a morphological filtering; and

20 performing an accentuation of parts of the object of interest visible in the respective image of the series of x-ray images on the basis of a motion of the object of interest.

4. The method of claim 2, further comprising the steps of:

25 enhancing image information relating to the object of interest on the basis of first and second order derivatives of the respective image of the series of x-ray images.

5. The method of claim 1,

wherein a determination of the image of the series of x-ray images where the object of interest is not sufficiently filled with the contrast medium is performed on the basis of a number of picture elements of the image having a value exceeding a preset threshold value.

6. The method of claim 1,

wherein a determination of the image of the series of x-ray images where the object of interest is not sufficiently filled with the contrast medium is performed on the basis of a histogram analysis, a feature curve analysis and a feature curve segmentation.

7. The method of claim 6,

wherein the feature curve segmentation is performed by using a maximum likelihood segmentation.

8. The method of claim 1,

wherein the series of x-ray images is a time series of x-ray images;

wherein first histograms of the time series of x-ray images are analyzed over the time to obtain a time dependent feature curve related to a presence of contrast medium in the object of interest;

wherein a 95 percentile of the first histograms is used to determine a feature function;

wherein a second histogram is formed of the feature function;

wherein a threshold is determined in the second histogram which separates a first state of an image where the object of interest is filled insufficiently with the contrast medium from a second state of an image where the object of interest is sufficiently filled with the contrast medium; and

wherein a transition matrix is determined for describing a probability that the first state changes to the second state.

9. The method of claim 8,

wherein the second histogram is modeled by means of a plurality of Gaussian distribution density functions such that a probability is determined for values of the 95-percentile relating to whether the respective values belong to the first state or the second state.

10. The method of claim 1, wherein the method is for determining images of coronary angiograms where the vessel tree of the heart is sufficiently filled with contrast medium.

11. Image processing device, comprising:

a memory for storing a series of x-ray images of an object of interest wherein the object of interest is visible due to a contrast medium; and

an image processor for processing the series of x-ray images of the object of interest, wherein the image processor is adapted to perform the following operation: automatically determining an image of the series of x-ray images where the object of interest is not sufficiently filled with the contrast medium.

12. Computer program for processing a series of x-ray images of an object of interest wherein the object of interest is visible due to a contrast medium, wherein the computer program is adapted to cause a processor to perform the following operation when the computer program is executed on the processor:

automatically determining an image of the series of x-ray images where the object of interest is not sufficiently filled with the contrast medium.